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SPECIFICATION FOR NON-SKID TYPE CHAIN ASSEMBLY FOR TYRES-SINGLE TYPE

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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March 1981

Indian Standard

SPECIFICATION FOR NON-SKID TYPE CHAIN ASSEMBLY FOR TYRES-SINGLE TYPE

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Indian Standard

SPECIFICATION FOR NON-SKID TYPE CHAIN ASSEMBLY FOR TYRES-SINGLE TYPE

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 29 August 1980, after the draft finalized by the Lifting Chains, Associated Fittings and Components Sectional Committee had been approved by the Marine, Cargo Movement and Packaging Division Council.

0.2 This standard covers the chain assembly used on pneumatic tyres of vehicles as non-skid chains. These chains are used to obtain a sure and safe grip on such slippery surfaces as snow, mud, ice, sand and grass.

0.3 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the manufacture, standard sizes, dimensions, methods of testing, packing and preservation of non-skid chains.

2. DESIGN AND CONSTRUCTION

2.1 The chain shall consist of two straight link side chains, twisted link cross chains, end hooks or lock fasteners or catch and latch, all properly assembled and ready to put on tyre. The cross chains shall be attached to the side chains by means of connecting links.

2.2 The catch and latch/end hook/lock fasteners shall be capable of readily being opened and closed and shall be safe against accidental opening or detachment.

---

*Rules for rounding off numerical values (*revised*).

2.3 The assembly end hook and connecting link shall be made in such a manner that it shall not cause rubbing or damage of any type to tyre.

2.4 The twisted links shall not extend by opening or flattening while running the vehicle with chains under full load conditions.

2.5 Twisting of the links shall be done in such a manner which ensures equal angle of twist on the links.

2.6 The overall dimensions and end fittings shall be governed by Table 1.

3. COMPONENTS

3.1 The size and type of the straight and cross links, number of links in each section, spacing, number of cross links and type of end connector for various sizes shall be as shown in Fig. 1 to 8.

3.2 Side Chains — The chain shall be electrically butt welded and shall conform to IS : 3109 (Part I)-1970* regarding material and heat treatment. The dimensions and load shall be as given in Table 2.

3.3 Cross Chains — Cross chains shall be twisted link chains conforming to IS : 6217-1971† regarding material. Dimensions and load shall be as given in Table 3.

3.4 All chains shall be electrically resistance butt welded so as to form a continuous loop. The welded joint shall be free from cold shuts, slag and other defects.

3.5 The cross chains shall be connected to the side chains by means of 'connecting link' whose design shall provide easy replacement of broken/worn cross chains.

3.6 Catch and Latch/Lock Fasteners — These shall be made out of hot rolled carbon steel sheet and strip with tensile strength 50 – 60 kgf/mm^2 conforming to IS : 1079-1973‡.

4. TOLERANCES

4.1 Tolerances shall be as follows.

4.1.1 *Material Diameter* — Tolerance for material diameter up to 16 mm shall be +2, —6 percent as per IS : 6217-1971†.

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*Specification for round steel link chain (electric butt welded), grade 40: Part I Non-calibrated load chain for lifting purposes (*first revision*).

†Specification for round steel link chain (electric butt welded), grade 63, non-calibrated for lifting purposes.

‡Specification for hot rolled carbon steel sheet and strip (*third revision*).

TABLE 1 OVERALL DIMENSIONS FOR CHAINS

(*Clause* 2.6)

TYRE SIZE	SIDE LINKS WIRE DIA	NO. OF LINKS	CROSS LINKS		NO OF LINKS	CONNECTING LINK		LENGTH, *L*	WIDTH, *W*	TYPE OF END CONNECTION
			Wire Dia, d_2	No. of Rows		Wire Dia, d_3	No. of Links			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	mm		mm			mm		mm	mm	
6×16	6·3	80	8·0	8	56	6·3	16	1 715	334	A
7×16	6·3	80	8·0	10	90	6·3	20	1 720	370	B
7·5×20	8·0	104	10·0	11	99	10·0	22	2 303	410	A
8·25×20	9·0	84	10·0	9	90	10·0	18	2 295	432	C
9×16	8·0	90	8·0	11	143	8·0	22	1 898	464	D
9×20	9·0	94	10·0	11	77	10·0	22	2 295	478	B
10·5×20	9·0	102	10·0	12	84	10·0	24	2 490	478	B
10·0×20	9·0	102	10·0	12	84	10·0	24	2 490	478	B
12×20										
14×20										
15×20										
18×24										

TABLE 2 DIMENSIONS FOR SIDE CHAINS

(*Clause* 3.2)

CHAIN (1)	TITLE (2)	WIRE SIZE (3) mm	INSIDE PITCH, p_1 (4) mm	INSIDE WIDTH, w_1 (5) mm	OUTSIDE LENGTH (6) mm	OUTSIDE WIDTH (7) mm	PROOF LOAD (8) t	BREAKING LOAD (9) t	WEIGHT (10) kg/m
450	S	4·50	31·7	7·9	40·7	16·9	0·625	1·25	0·34
500	S	5·00	32·5	8·4	42·5	18·4	0·775	1·55	0·43
600	S	6·00	43·0	9·0	55·0	21·0	1·115	2·23	0·65
710	S	7·10	46·2	10·7	60·4	24·9	1·56	3·12	0·84
800	S	8·00	49·0	12·0	65·0	28·0	1·98	3·96	1·10
900	S	9·00	49·1	13·5	67·1	31·5	2·51	5·02	1·43

TABLE 3 DIMENSIONS FOR CROSS CHAINS

(*Clause* 3.3)

CHAIN (1)	TITLE (2)	WIRE SIZE (3) mm	INSIDE PITCH, p_1 (4) mm	INSIDE WIDTH, w_1 (5) mm	OUTSIDE LENGTH (6) mm	OUTSIDE WIDTH (7) mm	PROOF LOAD (8) t	BREAKING LOAD (9) t	WEIGHT (10) kg/m
500	C	5·00	22·0	7·5	32·0	17·5	1·22	2·44	0·48
560	C	5·6	23·0	8·4	34·2	19·6	1·52	3·04	0·61
630	C	6·30	25·2	10·0	37·8	22·6	1·935	3·87	0·79
710	C	7·10	29·8	10·7	44·0	24·9	2·46	4·92	0·97
800	C	8·00	30·0	10·0	46·0	26·0	3·12	6·24	1·30
900	C	9·00	31·5	12·6	49·5	30·6	3·95	7·90	1·66
1 000	C	10·00	31·0	14·0	51·0	34·0	4·87	9·76	—

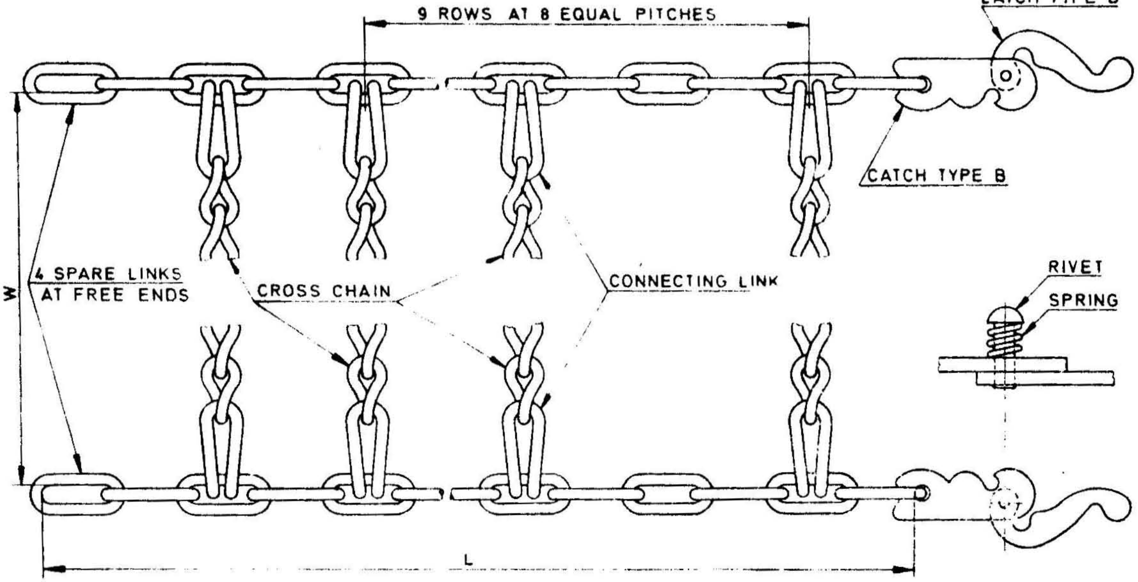


FIG. 1 DIMENSIONS AND NUMBER OF CHAIN ROWS, ETC, SHALL CONFORM TO TABLE 1

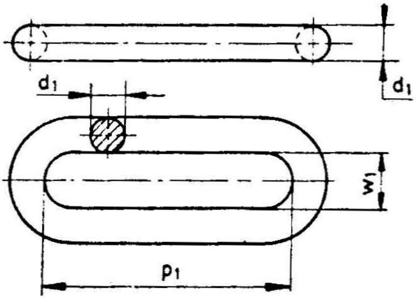


FIG. 2 SIDE LINK CHAIN

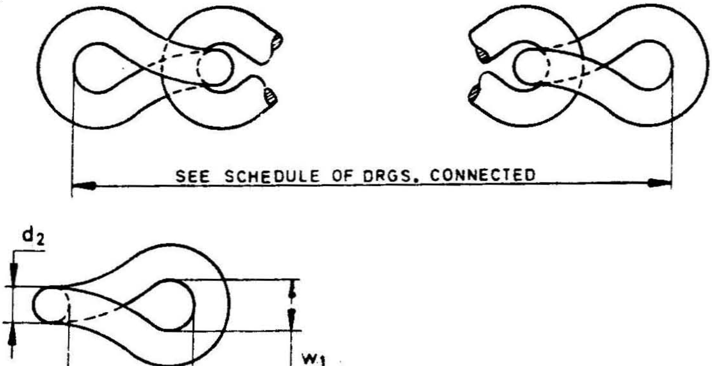
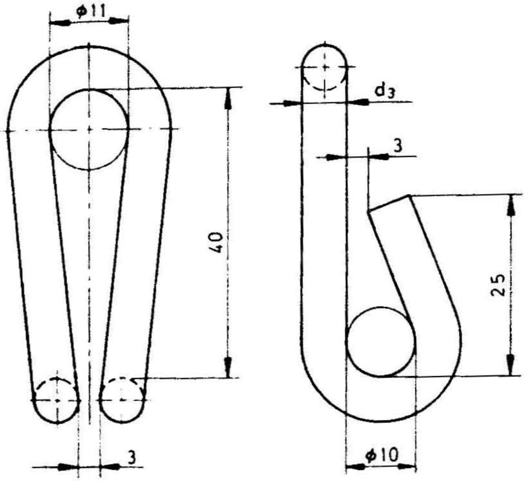
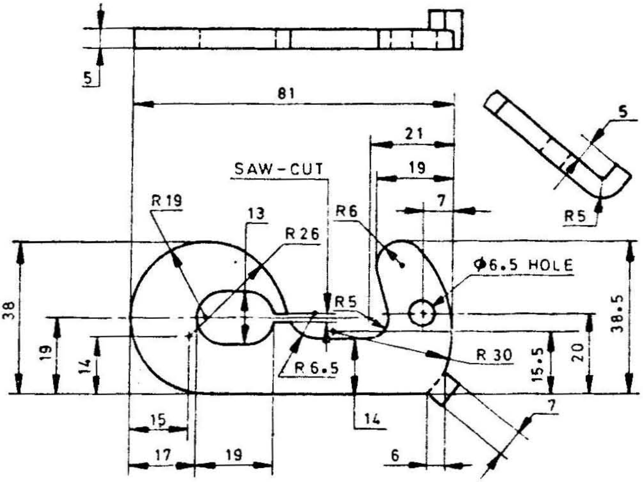


FIG. 3 CROSS LINK

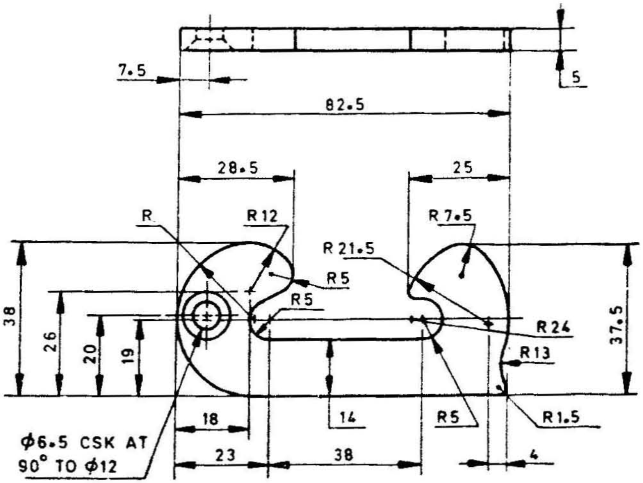


All dimensions in millimetres.

FIG. 4 CONNECTING LINK



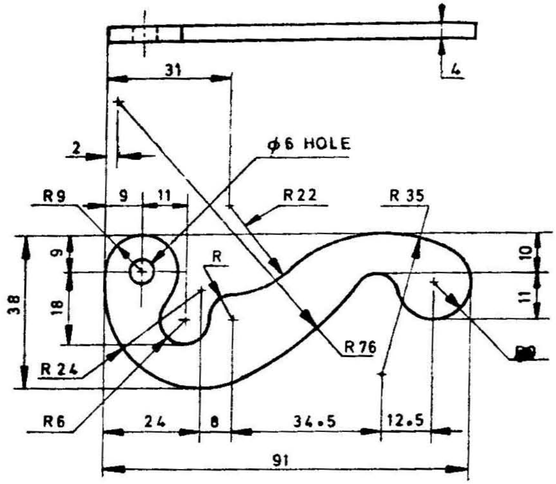
CATCH



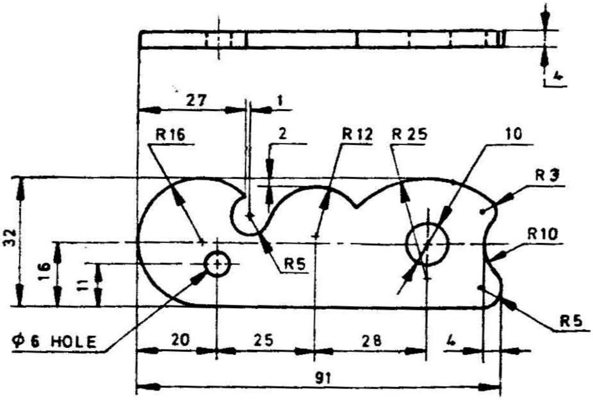
LATCH

All dimensions in millimetres.

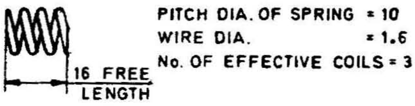
Fig. 5 End Connections — Type A



LATCH



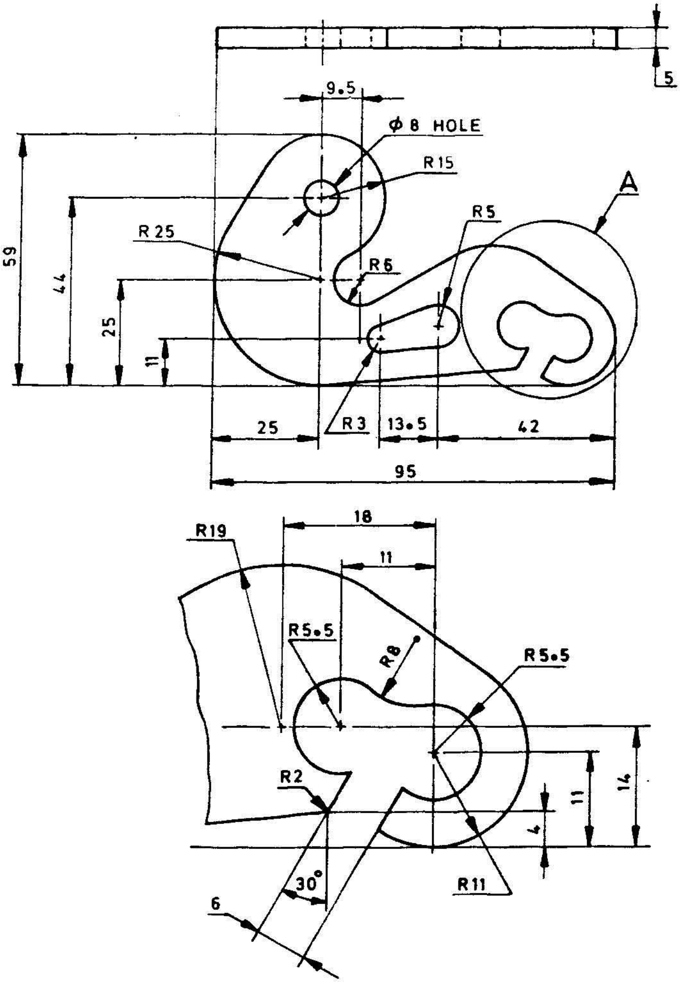
CATCH



SPRING

All dimensions in millimetres.

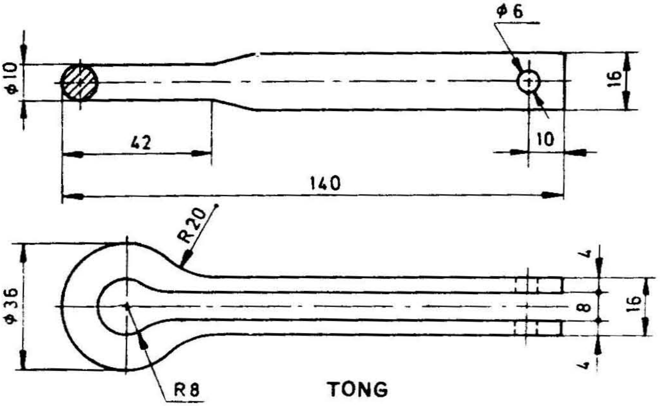
Fig. 6 End Connections — Type B



DETAIL AT A

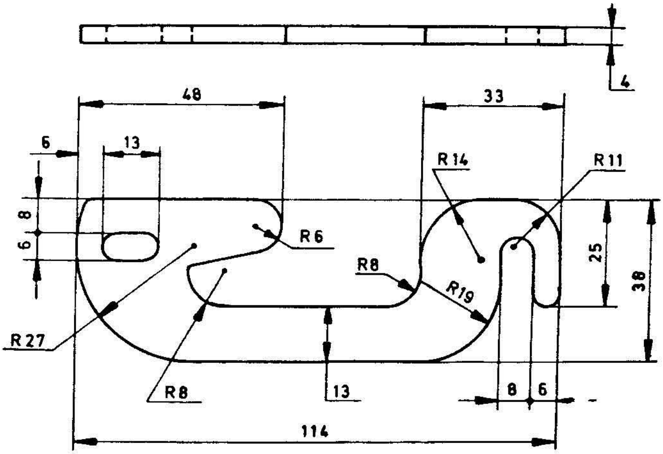
All dimensions in millimetres.

Fig. 7A End Connections — Type C

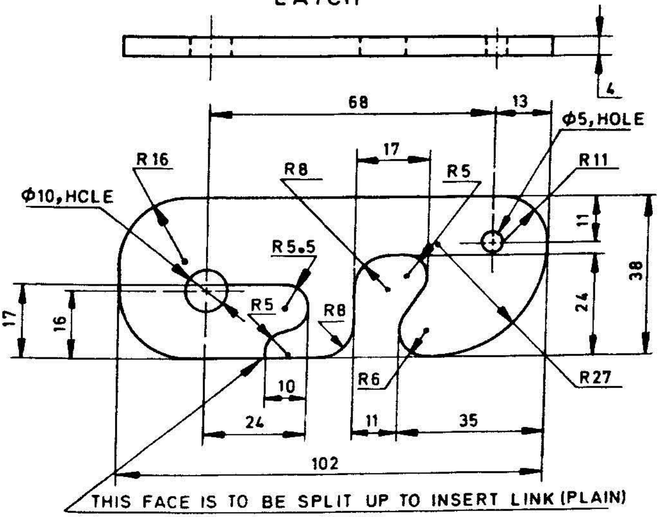


All dimensions in millimetres.

FIG. 7B END CONNECTIONS — TYPE C



LATCH



THIS FACE IS TO BE SPLIT UP TO INSERT LINK (PLAIN) AND CLOSED

CATCH

All dimensions in millimetres.

FIG. 8 END CONNECTIONS — TYPE D

4.1.2 *Side Chain Length* — +10 −0 mm of the nominal length.

4.1.3 *Cross Chain Length* — ±2 mm.

4.2 Tolerance at the Weld — The dimensions of the steel at the weld shall not be less than the diameter of the steel adjacent to the weld, or exceed it by more than the following tolerances.

4.2.1 *Asymmetrical Welded Chain* — 20 percent in the direction normal to the plane of the link. 35 percent in any other plane.

4.2.2 *Smooth Welded Chain* — 8 percent of the adjacent steel.

4.3 Affected Area Due to Welding — The weld or welds, shall be positioned in the centre of one or both legs of the link. The area affected dimensionally by welding shall not extend by more than 0·6 times the material diameter to either side of the link.

5. HEAT TREATMENT

5.1 Cross Chains — The chains shall be case hardened to produce an extremely hard and wear resisting surface with good resistance to shock, tempered for stress relief and maximum case hardness. The hardness values shall be as follows:

Hardness	485 – 545 VPN	
Case depth	*Min* 0·5 mm	
	Max 0·1 *d*	where *d* = material dia.

6. WORKMANSHIP AND FINISH

6.1 All chains shall be free from injurious defects and shall have a good workmanship and finish. The weld shall show no fissures, notches or similar faults. The welds shall be smoothly finished all round.

6.2 The side chains and cross chains shall be polished. All chains including hooks and fasteners shall have rust resisting finish to protect them in storage and in transit prior to use.

7. TESTING AND INSPECTION

7.1 Link Plain (Side Chain) — The chain shall be inspected and tested for loads in the final stage before assembly. 100 percent chains shall be proof tested and selected samples as per **7.2** of IS : 6217-1971* shall be tested for break load.

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*Specification for round steel link chain (electric butt welded), grade 63, non-calibrated for lifting purposes.

7.2 Link Twisted (Cross Chain) — Proof load test and breaking load test and material analysis for twisted chain shall be carried out before the chains are case carburised and twisted.

7.2.1 The following sequence shall be followed :

a) Proof load test shall be carried out on 100 percent unhardened chain before assembly;

b) The breaking load test shall be carried out on the selected samples as per **7.2** of IS : 6217-1971* from the unhardened chain but the test samples shall have to be hardened and tempered to ensure maximum breaking load; and

c) Material analysis shall be carried out on the samples destroyed in testing for breaking load.

7.3 All the basic chains shall be proof tested to 50 percent of the breaking load before cutting and assembly.

7.4 Provision for Inspection — The inspector shall have access to the works of the manufacturer at all reasonable times for the purpose of witnessing the specified tests and inspecting the testing machine and the method of examination. The manufacturer shall provide the inspector, at the time of inspection, with copies of the test sheets giving the results of all the tests made in his presence.

7.4.1 The manufacturer shall supply the samples required for testing free of charge and at his own cost, supply labour and appliances for such testing as may be carried out in his premises in accordance with this standard. In the absence of facilities at his own works for making the specified tests, the manufacturer shall bear the cost of carrying out such tests elsewhere. The purchaser, if he so wishes, may delegate the chain manufacturer to inspect the chain for him.

7.5 Test Certificate — The manufacturer shall supply a certificate of test and examination in accordance with **9.2** of IS : 5616-1970†.

7.6 The length of the side chain shall be determined by hanging the side chain vertically on a pin or on a jig. The diameter of the pin shall not be greater than the diameter of the side chain wire. The length of the side chain shall be considered as the dimension from the top of the supporting pin to the bottom of a pin inserted in the bottom of the last link in the side chain at right angles to the side chain and parallel to the supporting pin.

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*Specification for round steel link chain (electric butt welded), grade 63, non-calibrated for lifting purposes.

†Specification for electric butt welded steel chains for lifting purposes : General conditions of acceptance.

7.7 The length of the cross chain shall be measured similarly by hanging the cross chain vertically.

7.8 Hardness — Hardness test as specified in IS : 1501-1968* shall be made on the outside surface of the link on the side of the link opposite to weld.

7.9 Case Depth — The case depth shall be determined by etching. The specimen shall consist of a link prepared by grinding with a suitable abrasive wheel, a cross section perpendicular to the axis of chain material. It is then etched, in a solution of nitric acid and water (1 : 1 by volume) of specific gravity 1·217, for approximately 6 seconds. This treatment reveals the case as a dark ring. Width of this ring shall be considered as the case depth. Case depth shall be measured microscopically at 20 × magnifications and shall conform to **5.1**.

7.9.1 Case depth shall be tested on five test samples per lot and all shall pass the test requirements. If two or more samples fail, the test shall be repeated on five more samples. If one sample fails in the retest, the lot shall be rejected for rectification.

8. MARKING

8.1 The following shall be marked by stamping or engraving on the lock fastener or at any other suitable place readily visible:

a) Manufacturer's name/identity/monogram;

b) Month and year of manufacture; and

c) Part designations (Part No. in case of defence requirements).

8.1.1 Each chain may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

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*Method for vickers hardness test for steel (*first revision*).

9. SAMPLING

9.1 Side Chains and Attachments — The samples for inspection shall consist of 1 percent of each lot of 200 pairs or less of side chains and attachments.

9.2 Cross Chains — Samples for inspection and testing shall consist of 1 percent, but not less than 5 cross chains of the cross chains in each lot, to be selected at the discretion of the inspecting officer from the least number of cross chains. The lot will be accepted when all samples meet the requirements of hardness and case depth of the cross chains, and the material analysis. In the event that any samples fail to meet the specification, a resample of 2 percent of the chains in each lot shall be selected at the discretion of the inspecting officer. The lot will be accepted when all of the resamples meet the specification.

10. PACKING AND PRESERVATION

10.1 The chains shall be polished and oil preserved. The catch and latch/lock fastener shall be preserved with grease L No. 3 conforming to IS : 507-1970*.

10.2 Chains shall be packed as agreed to between the manufacturer and the purchaser.

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*Specification for general purpose grease (*first revision*).

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

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